

Heisenberg's Uncertainty Principle in Buddhist Philosophical Perspective

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Abstract

The research has three objectives: 1) to study the concept of Heisenberg's uncertainty principle, 2) to study the concept of reality and knowledge in Buddhist philosophy, and 3) to analyze the concept of Heisenberg's uncertainty principle in Buddhist philosophical perspective. This is documentary research. In this research, it was found that Heisenberg's uncertainty principle refers to the experiment of thought while studying physical reality on smaller particles than atoms where at the present no theory of Physics can clearly explain such properties. In this respect, the mentioned principle is utilized to predict the pairs of a certain attribute of physics, position, and momentum, for instance. The accuracy of position, however, cannot be precisely yielded in advance by such a principle. In other words, it is impossible to measure the position and momentum of a quantum particle at the same time. In the study of the ultimate reality on the matter in the Buddhist philosophy, it showed that corporeality in nature is conditioned by cause and effect and thereby falling under the three common characteristics: 1) impermanence, 2) state of suffering, and 3) state of non-substantiality. In the study of Heisenberg's uncertainty principle in the Buddhist philosophical perspective, this research was found that the processes in acquiring certain knowledge of Heisenberg and Buddhist philosophy are by one another in the sense that such knowledge is methodologically acquired through experience, rationality, and intuition because both see the Reality in the same manners, that is, the physical reality is viewed by Heisenberg as the thing that goes under changing state of wave-particle all the times, and the matter is seen by Buddhist philosophy as the impermanence and change depending upon its factors involved and thereby is not-self. However, in the different aspect, on the one hand, Buddhist philosophy utilizes the knowledge on the matter to develop the morality and ethics by which the cessation of suffering could be respectively made, but on the other hand, Heisenberg somehow applies the certain knowledge on physical objects into quantum technology to accommodate the physical comfortability in living life. Suggestions in the application of knowledge gained from this research into benefit were that while Buddhist philosophy can make use of Heisenberg's uncertainty principle to provide certain help at the time of explanation of three common characteristics being done through the scientific method, science also can utilize knowledge gained from Buddhist philosophy to expand the framework of scientific knowledge which is aimed at studying only the physical objects to be able to study the mental objects through the integration of three epistemological methods as well.

Key words : Heisenberg's Uncertainty Principle, Anicca, Buddhist Philosophical Perspective

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Introduction

19th century, most physicists believed that the theory of physics has reached a level in which all phenomena of nature can be explained. The thought process of searching for the laws of nature has come to an end. Most of the missions that physicists performed at that time only needed to improve and develop experimental equipment to measure various values. To be more accurate and detailed but from the tools and equipment that has a more advanced image make new mysteries. The existence of nature began to emerge so much that the theory of physics that was believed to be perfect could not be explained by the discoveries, (Niels Bohr, 1991) which gave rise to new ideas that were completely different from old beliefs, a great revolution of physics (Werner Heisenberg, 1952). The milestones that led to the development of the Quantum Theory, which became the foundation of modern physics since Max Planck have succeeded in explaining the blackbody radiation. He hypothesized that. While the light is emitted from the surface of the black body that has the power discontinuity is $E = nhf$ when f is the frequency of light which is the constant of Planck and n is an integer in other words. The smallest unit of light called photons is equal to the energy $h\nu$, which is not split up the remaining n represents the number of photons it. In 1922 from the works of Planck and Einstein which even if it indicates that light behaves like particles, but this is not enough to conclude that Photons are particles (Albert Einstein, 1967). This is because waves and particles have very different properties. Waves have frequency and wavelength. Particles have energy and momentum so that photons have energy equal to nhf is just one of the properties of particle (Ah Compton). X-ray scattering measurements showed that photons also had momentum (Rainer Dick, 2007). Photons move at the speed of light, so the momentum of a photon is $P = E / c = hf / c$, where c is the speed of light. Compton's results make it clear that Photons have perfect properties of the particles. Later, De Broglie proposed the idea that from the symmetry of nature when waves can have particle behavior Particles must be able to behave in waves. The properties of a particle or a wave, the wave properties of particles called wave-particle duality, as a cornerstone in the development of the quantum theory (Werner Heisenberg, 1958). Schrodinger finally invented the wave equation, the first real work of quantum theory. The current wave equation is called Schrödinger equation and a masterpiece of wave mechanics theory in 1926. 1927, Werner Heisenberg is a pioneer of quantum theory, another important person by relying on the wave-particle duality. He proposed new ideas on measurement and measurement uncertainty, compiled in The Heisenberg uncertainty principle It is the cornerstone of quantum theory. He is also the originator of the Matrix Mechanics theory, another facet of quantum theory. Schrödinger's wave mechanics theory and Heisenberg's matrix mechanics have completely different mathematical details. but today they are actually found to be the same theory, and they are referred to as quantum mechanics, one of the fundamental theories of modern physics capable of explaining the results of specific experiments (V.S. Varadarajan, 2018). Especially when the size of the object of interest is so small to the atomic level, Einstein's Theory of Relativity cannot be used to describe the physical truth or reality. The concept of Buddhist philosophy on the nature of all being and non-being was called the law of commonality or the three characteristics of all things: vanity (impermanence), every prison (suffering), Anatta (non self) at the heart of the practice of Dharma. It is teaching with a direct benefit. Comparable to in a handful of sticks for liberation only for

the cessation of suffering When considering the 5 Dharma principles taught by the Lord Buddha, it was found that the physical law covers all theories of physics. The researcher interested in Heisenberg uncertainty principle, one of two pillars of modern physics that studies the physical reality of nature at an atomic level, yet unable to use any theory of physics to explain this level of truth or reality. It has similarity or correlated with the anicca or impermanence in Buddhist philosophy, a concept that describes the truth as one of the three marks of existent.

Research objectives

1. To study the concept of Heisenberg's uncertainty principle.
2. To study the concepts of truth and knowledge in Buddhist philosophy.
3. To analyze the concept of Heisenberg's uncertainty principle from by Buddhist philosophical perspective

Research methodology

This is documentary research aimed at gathering the main issues related to Heisenberg uncertainty principle add Heisenberg uncertainty principle in Buddhist philosophical perspective. The books, researches, and documents are used in this study as following ;

1. Primary source is Tripitaka Holy Scriptures and other two books namely "Physics and Philosophy" and "Philosophical Problems of Quantum Physics" written by Werner Heisenberg.
2. Secondary source including books, academic journals, thesis dissertation, and scientific and philosophy research which relate to this thesis dissertation.
3. Identify those issues for analysis.
4. Analyze and explain the concept of submarines. This is due to the uncertainty in the Heisenberg uncertainty and the Impermanent in Buddhist Philosophy.
5. Deals with explaining concepts in both compliance and non-compliance issues
6. Summarize the findings and present them as research work according to the order of objectives.

Research Value

1. Understanding of Heisenberg's uncertainty Principle
2. Understanding of uncertainty (impermanence or anicca) in Buddhist philosophy.
3. Lead to a better understanding of the similarities and differences between Heisenberg's uncertainty Principle and the Impermanence in Buddhist philosophy.

Result

Werner Heisenberg conducts a thought experiment (Heisenberg's Gamma-Ray Microscopic Thought Experiment). Particles in classical physics, which are moved in the direction below the microscope, let the light cone escape from the microscope lens. According to the classical lens rules, the microscope will be fixed the position of the electrons precisely. Heisenberg's Gamma-Ray Thought Experiment play the important role in this experiment as semi-classic arguments. This is a concept that uses classical physics plus the concept of modern physics. Heisenberg's Uncertainty principle shows clearly that. It is because of the duality of wave- particles. The particles will spread out over an area where it is instead of a range of positions similar to momentum therefore we cannot know precisely since the size of the particles consists of wave packets (Massanao Ozawa, 2003). Each at its momentum for the most stable conditions. Valuable insights of the core of Heisenberg's Uncertainty Principle is the relationship between the position and momentum. It is the same as the relationship between sound and frequency. This insight enriches our knowledge of how the world works. By telling us that, at depths down to the most granular level that everything is made up of a duality of wave-particle. We know waves are correlated with the frequency and value of the property so that the energy from things such as living or non-living are all around us all the time considering the aspects to be seen. We are part energy of the universe, a component of the overall environment of the characteristics of knowledge of the Heisenberg's uncertainty principle that showed us that we can have direct knowledge or it can be called immediately Knowledge. That requires the experience of the test subject or observer by Heisenberg considered any particles before the experiment, the uncensored measure is meaningless in line with the world perception of the Buddhist philosophy that relies on the five senses and spirits. It is the door to perception. The main feature of the uncertainty request of Heisenberg's is the public. This is consistent with the concept of the knowledge of Buddhist philosophy. As said, it is the same public that when the practitioner is aware of the ultimate truth. You can match the circumstances justified the seats of the equation, Heisenberg's uncertainty principle to some extent at the level of atoms or smaller than Planck's scale where the level of the particle size is very small or invisible. Physicists cannot use any physics theory even Einstein's theory of relativity could not be described as such a physical reality and phenomena. Moreover, Heisenberg's uncertainty principle shows that a quanta particle is not a particle in itself but at the properties of the particles. Quanta has shown himself in the environment for experimental design. The experiment was designed by using scientific instruments to measure the physical reality of atoms. The most important which should be concerned is that during the measurement by the scientific instrument, the observer was observed by experimental system too because the particle would not be able to separate the observer's interaction with the measurement from a Buddhist philosophical point of view. Light conditions are emptiness or we can say Emptiness-Relativity (Interdependent) is the existence of this nature or world. It has nothing to do with how humans think of it in any way. Scientific realism is a view that tells us that science can ultimately tell us what this reality is. For example, the saying "negatively charged electrons" is a scientific message. According to the viewpoints of realism and science, if this message is true so it means that in nature or in the real world there is a so-called " electron" which is found to have one property of "negatively charged" and that this property is a fixed property of an

electron(realism). This is what most scientists, as well as ordinary people, believe about science. However, the beliefs of the Copenhagen Interpretation (John G Gramer, 1986). In particular, Heisenberg will be different. While they believed realism (Statement,) any scientific. If true, it means that the "concept" or "word" in the sentence must exist, for example, "electron" must exist or "negative charge" must exist, but Copenhagen does not believe it. Even the simplest and most common concepts, such as the existence of space and time, are therefore impossible for us to know the true truth by using the pure reason alone. The sentence mentioned above rejects their belief that realism message (Statement) any science, if true, would mean that the "concept" or "word" in a sentence that must exist. In contrast, Heisenberg suggests that we never know the extent of truth in any scientific "concept" or "word". He also cited examples of the term "position" and "speed", which in Newtonian mechanics are terms where one can find its exact meaning. But the same word, when it comes to quantum mechanics, turned into a there is no definite meaning to it. Which corresponds to anicca or impermanence in Buddhist philosophy and from texts in physics and philosophy books we can conclude that Heisenberg and the Copenhagen School have a philosophical view of "Instrumentalism", a belief that all knowledge that science can give to us is merely the processing or synthesis of experience given to us by science or scientific research, so scientific knowledge is not a real thing in nature. It is knowledge of what appears to the senses when scientists use their senses to measure the quantities that they work. By the words that scientists use to refer to things in theory that are beyond the direct senses. It is only words that play a role in theory but it has no role in indicating what is true in nature. This is "Instrumentalism" because it is considered Scientific experimental devices play a necessary role in determining whether humans know what or not. Moreover, it determines the possible boundaries of knowledge as well while the boundaries of knowledge in Buddhist philosophy including the spiritual realm so that the scope of knowledge in Buddhist philosophy is broader than Heisenberg's uncertainty principle.

Conclusion

The conclusion according to the order of objectives are described respectively. Objective 1, Heisenberg's uncertainty principle derived from Heisenberg's Gamma Ray Thought Experiment which studies the physical reality of particles that smaller than atoms. Currently, none of theory can describe any physical reality or physical phenomena of that particle size. Heisenberg's uncertainty principle told us that there is wave-particle duality, the physical properties of atom. For example the position and momentum, it was found that it is impossible to predict the pre-state of the particle for sure, that is, the more detailed one of these properties is known. It is hard to predict another feature or measure the another property precisely. In other word, it is impossible to measure both the position and velocity of a particle at the same time with any degree of certainty or precision. There is no condition in which a particle has both its precise position and momentum. Objectives 2, the three marks of existent or three common laws of all things that is, all things containing constituents or factors. That depends on the cause will fall under the three common laws or the three marks of existent which are 1) Anicca or impermanent, means uncertainty that caused from the change of factors 2) The suffering, means that things are always pressured imperfection and conflict in our

self or body. 3) Anatta, intangible or non-existent means all things are nothing that cannot exist alone (Emptiness-Relativity). The Buddha honestly expressed these laws are dharma. Is something that is normally poised. Is something that stands naturally regardless of whether the Lord Buddha arose or did not rise, the natural law said that all things are impermanent. All sankhas are suffering and all virtues are anatta. All things are impermanent, suffering and soulless. It is an ordinary state that exists like that. Who will command or inspire to be can or cannot be obtained anywhere else. The wise should only determine the truth. Knowledge in Buddhist philosophy is direct or immediate knowledge because knowledge was gained by applying direct experience in knowing things in the outside world. We can know the outside world directly with the five senses and the mind. The knowledge of Buddhist philosophy is the knowledge that requires experience (a posteriori) in the sense that the acquisition of that knowledge requires the experience of the person to prove or test until he or she knows and manifests itself. To myself as true Knowledge of Buddhist philosophy is what is the public, in the process of accessing the knowledge that the Buddha both reason and experience until it can be said that about knowledge Buddhist Philosophy considers both experience and reason to play a role and as a means to help bring knowledge together. Both reason and experience are of their limitations. Alone of one reason or experience will not be able to provide us with complete knowledge therefore Buddhist philosophy uses both experience and rationale to help us gain better access to the knowledge.

The researchers found that Heisenberg's uncertainty principle results from how we set the experiment so the answer we got will variable and depend on the way we set the experiment or the question we ask. When considered this thought experiment acquisition of knowledge is classified as being at the knowledge level, the intellectual and imaginary level. When considered from a Buddhist philosophical perspective, it is also found that Heisenberg's uncertainty principle is supported by the concept of Buddhist philosophy, in which "there is something that we cannot be sure or certain of". In other words, it can be interpreted as "we cannot be sure or uncertainty predict the behavior of atom of the things. Due to everything as it appears to our perception, it is the result of many factors or causes from the past too. However, this uncertainty may be something that is already hidden in things both being and non-being. How this will affect to us if we are not confident in everything, that doesn't mean there are some things you can't be sure that you don't have. Ultimately, our science is concerned with what we observe. When we say that we are unsure about something, we mean that we are unsure of what we will observe when we do our testing. With all of that said, it can be concluded that we cannot predict the future of the particle. In particular, the low level of accuracy is associated with the fixed value of Planck's scale. We cannot predict very specific statistics of the results of similar particles. The result is for a particular particle will befall in the range of possibilities and this period can be expected. The specific effects on particles only are we not say why small and not underestimate what it might be why the universal from the process. It could not be claimed that the result for every event has a cause and a reason for the same (David C. Cassidy, 1992). The "Heisenberg's uncertainty principle"

suggests some great philosophical ideas, such as "We can't be sure" or "There are some things we can't be sure of". This principle has a precise technical meaning that generally deals only with microscopic particles, but what does it mean for us to understand the universe and our relationship with it in the 21st century that we should concern. An era with great scientific and technological progress, Heisenberg Uncertainty Principle Doesn't mean "There are some things that we cannot be sure of," but that doesn't mean that we can't be sure of everything at all (PHRS.ORG, 2013). Science is all about what we observe so when we say that we are unsure about something, we mean that we are unsure of what we will observe when we do our testing.

Heisenberg's uncertainty principle or it can be said that "indeterminate relationships" in one form or another, is a useful principle in almost any science that deals with very small amounts of matter or energy. Heisenberg's uncertainty principle told us about the nature of the physical reality (Albert Einstein, B.Podolsky and N.Rosen, 1935) that we have realized that. We cannot predict the future of the particles. Highly predictable only statistics of similar particle effects within the range of probability and range can be predicted. But the specific effect on that particular particle cannot be known accurately, the claim that every event has a cause and when the same cause is repeated will have the same effect, so it is not always certain.

Discussion

Heisenberg's proposition of uncertainty is the inevitable fundamental truth of the world. This eliminates all possibilities in the investigation. The correctness of the principle with all kinds of experimental results and all kinds of tools that are present and will have in the future so this urgency is unreliable in physics. Due to the various theories in physics and no matter how accurate they are then it must be inspected and maintained always from the trial. Although examining a theory with an experiment gives the right results but when examining it with another kind of experiment it may give inaccurate results and it is possible. In the future, instruments in physics may be developed to be more accurate or physicists may be able to find new experimental or scientific methods to measure the velocity and position of particles. We cannot be sure that this principle will be true forever, uncertainty itself told us. Heisenberg's uncertainty principle and the duality of wave-particle in quantum mechanics were used to show that one such theory is indeterminism. Quantum mechanics uses a new form of mathematics. It does not describe the real world in terms of particles and waves. It only uses particles and waves as a loose frame to observe. Both particles and waves have two bodies or duality properties. In some cases, looking at a particle as a wave gives us a better explanation, and likewise for some cases of looking that a wave is a particle would give us a better explanation. The quest for scientific knowledge is characterized by the accumulation of various types of scientific knowledge ranging from fact, principle, hypothesis, theory, and law. Examination or forecast of different types of knowledge can create a new problem, hypothesis and has uncovered new knowledge increases the scientific knowledge but it is not the truth (ultimate reality) which we must also seek the new knowledge further.

The scientific method is important because it results in a progressive scientific knowledge for us to learn that is considered as status that is consistent with Buddhist philosophy according to the three truths is

1. To learn, tell, understand clearly.
2. To take action, perform tests, experiment, prove to see the truth as they know it.
3. Adversity brings results, that is realizing it as a result which can achieve from practice

The researchers realized that the advancement of that science when we thought we had solved one of the basic problems encountered another new mystery. Science is unable to solve the ultimate truth or reality of nature at this time. When analyzed down to the very end we are a part of nature and therefore it is part of the ultimate truth or reality that we are trying to solve. The ultimate reality, that is an escape from suffering. (Preecha P. Yupapin, 2014). From the study of truth and knowledge, criticism followed the Buddhist philosophy, including the four Noble Truths and meditation practice.

The greatest advancement in Science at this moment is coming to know the truth that Science cannot reach the ultimate truth. The ultimate truth or reality that is beyond the boundaries or beyond the capabilities of science exists. The truths in the spiritual realm must be studied and proven by means and instruments in the spiritual realm that will make it accessible. That is the ultimate truth or nirvana in Buddhist philosophy.

Suggestion

Being aware of the fact that Science will not be able to bring mankind to the ultimate truth. According to the scope of what science studies is the physical reality which can be perceived by senses. It can be classified as materialism while life in Buddhist philosophy has the ultimate goal of being free from suffering or nirvana. Knowing of the Buddhist philosophy as a key or guideline for understanding and practice to escape from suffering.

Suggestions for further research

There should be further research studies on the following topic "The Relation Between Quantum Mechanics and Quantum Consciousness"

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